

Dwarf forms of dragonflies in Portuguese coastal waters (Zygoptera: Calopterygidae; Anisoptera: Libellulidae)

Peter Jahn

Schillerpromenade 30, D-12049 Berlin, Germany

Very small specimens of *Calopteryx haemorrhoidalis* (Vander L.) and *Orthetrum coerulescens* (Fabr.) are recorded, and questions are raised with regard to possible exogenous or endogenous causes of this dwarfism.

Observations

On September 17 and 18, 1983, I found numerous *Calopteryx haemorrhoidalis* at a coastal brook south of the Rio Mira estuary, near Vila Nova de Milfontes in south-west Portugal. Reproduction at this place was verified by some collected larvae and subadults. The imagos were noticeable for their unusually small dimensions. Two specimens have been collected, and their measurements are shown in Tab. I.

Table I: Measurements of two specimens of *Calopteryx haemorrhoidalis* from a coastal brook in SW Portugal.

	male	female
length of abdomen	34.4	30.3
length of appendices	1.2	0.6
length of hind wings	25.5/26.0	26.0/26.0
width of hind wings	7.9/8.1	7.4/7.4

At another location, a small channel east of the road between Vila Nova de Milfontes and Odemira about 8 km inland from the coast, *C. haemorrhoidalis* has been observed on July 29th, 1981. The body size of these specimens did not attract special attention according to the. Unfortunately I did not collect any voucher specimens at this location.

At the brook south of the Rio Mira estuary a male *Orthetrum coerulescens* was secured, and breeding confirmed by the presence of larvae. The measurements (mm) of the specimen are:

length of abdomen: 23.3 length of appendices: 1.7
length of hind wing: 27.4 width of hind wing: 8.7 length of pterostigma: 3.3

Discussion

Very small individuals of *Calopteryx haemorrhoidalis* have also been collected by Matthias Hartung, Berlin. He detected this species south of my study site at a similar brook near Almo-grave, and collected several specimens during September 1980. Their measurements are similar to those of my series (M. Hartung, pers. comm.; Tab. II). Typical *C. h. haemorrhoidalis* from Spain (NAVAS, 1924; OCHARAN LARONDO 1987; Tab. II) are bigger, whilst the wings of those from Menorca are also short.

Table II: Comparison of measurements of nominotypical *Calopteryx haemorrhoidalis* from Portugal and Spain.

sex	abdomen	hindwing	location	reference
male	34.4 (n=1)	26.0 (n=1)	SW Portugal	present paper
female	30.3 (n=1)	26.0 (n=1)	"	"
male	32.4 ± 1.3 (n=4)	25.3 ± 0.8 (n=4)	SW Portugal	M. Hartung, in litt.
female	31.7 ± 0.2 (n=3)	26.7 ± 0.2 (n=3)	"	"
male/female	35-42	25-33	Iberia	NAVAS, 1924
male	40.60 ± 1.96 (n=29)	31.02 ± 1.17 (n=35)	Extremadura	OCHARAN, 1987
female	36.49 ± 1.23 (n=18)	31.98 ± 0.95 (n=21)	"	"
male	35.48 ± 1.46 (n=8)	26.08 ± 1.03 (n=9)	Menorca	OCHARAN, 1987
female	34.27 ± 0.93 (n=4)	27.92 ± 0.94 (n=4)	"	"

The dimensions of the male *Orthetrum coerulescens* are strikingly lower than those of other Spanish material (NAVAS, 1924; BENITEZ MORERA, 1950; OCHARAN LARONDO, 1987). According to these authors, the lower limit of abdominal length is 25 mm and of hindwing 28 mm.

The dwarfism that is described for both species might be caused by the specific conditions of the coastal region. For this to be resolved, it has to be decided whether the phenomenon is genetically determined, or governed by external influences during ontogenesis.

In case of the former, genetical causes can be excluded if dwarfism is revealed to be restricted to a small area which is not reproductively isolated. However, if body size decreases continuously from inland to the coast, as is suggested by the measurements of the heteropteran *Nepa cinerea* L. (Jahn, unpubl.), such a gradient could indicate a genetical drift. In this context it may be of importance that, in the coastal region, stronger aerial movements are more frequent than inland. Furthermore, there is less protection against the wind in the coastal region. This could be of selective significance for a relatively weak flyer like *Calopteryx*, because the efficiency of the muscles increases with decreasing body size in relation to the wing area.

In the latter case, unfavourable conditions during larval development, for instance nutritious deprivation, could effect such a result. This does not seem to be plausible, because the phenomenon occurs in heterogenous waters. Other factors, like coastal climate or sea-water ions im-mitted as aerosols, might have similar influences on larval development in different places. There is at present no evidence for this, and it remains pure speculation.

To solve this problem the following questions should be investigated:

- Does there really exist a decreasing size gradient from inland to the coast in the study area?
- Do other insects, especially also terrestrial species, of that region show similar tendencies?
- Which factors influence the larval growth at the breeding site?
- If dwarfism occurs in other areas: what are the conditions there?

References

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